TD 23-6920-704-10
TM 08673A/09134A-10/3

TECHNICAL MANUAL

OPERATOR'S MANUAL

MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES 2000)

TACTICAL ENGAGEMENT SIMULATION SYSTEM (TESS)

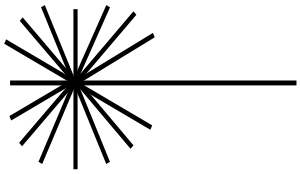
FOR

SURROGATE WEAPONS SYSTEM (SWS) AT4/SMAW

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS
You can help improve this manual. If you find any mistakes or you know of a way to improve the procedures, please let us know. Mail your letter, DA FORM 2028 (Recommended Changes to Publications and Blank Forms), or DA FORM 2028-2 located in back of this manual directly to Commander, Simulation, Training, and Instrumentation Command (STRICOM): ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. Marine Corps users submit NAVMC 10772 to: Commander, Marine Corps Logistics Base (Code 826), 814 Radford Boulevard, Albany, GA 31704-1128.

HEADQUARTERS, DEPARTMENT OF THE ARMY AND UNITED STATES MARINE CORPS

27 MAY 2002



LASER WARNING

Suitable precautions must be taken to avoid possible damage to the eye from overexposure to radiated laser energy. Precautionary measures include the following:

- **NEVER fire the laser** at personnel within 10 meters.

- **NEVER look at the laser transmitter** through magnifying optics such as binoculars, telescopes, or periscopes at ranges less than 40 meters.

LIST OF EFFECTIVE PAGES

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TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 40 CONSISTING OF THE FOLLOWING:

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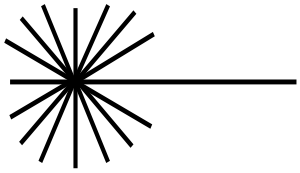
SAFETY SUMMARY



LASER WARNING

Suitable precautions must be taken to avoid possible damage to the eye from overexposure to radiated laser energy. Precautionary measures include the following:

- **NEVER fire the laser** at personnel within 10 meters.
- **NEVER look at the laser transmitter** through magnifying optics such as binoculars, telescopes, or periscopes at ranges less than 40 meters.

WARNING

- To avoid personal injury, when handling the SMAW, ensure the FIRE/SAFE lever is in the "SAFE" position, and the CHARGE lever is NOT in the "CHARGE" position before inserting or removing the "Rocket Casing." If the charge lever is in the "CHARGE" position, follow these procedures: 1) Place the FIRE/SAFE lever in the "FIRE" position; 2) Flip the launch lever while pulling the trigger. This will trip the charge lever; 3) Place the FIRE/SAFE lever in the "SAFE" position.
- DO NOT let the muzzle of the SMAW Launch Tube touch the ground. If the muzzle should touch the ground, check the Launch Tube and bore of the spotting rifle for dirt, rocks or other foreign material, and remove and clean. Keep the muzzle pointed down range at all times, or personal injury could occur.

FIRE/EXPLOSION WARNING

- Visually check the SMAW or AT-4 to see if the firing pin is protruding. If it is, **DO NOT** install the ATWESS cartridge as serious personal injury may occur. Return the weapon to the issue facility/authority. Sign out another weapon.
- Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur.
- ATWESS cartridges may expel fragments/debris. Maintain prescribed actual weapon back blast danger/caution zones when using the ATWESS, or personal injury could occur.
- Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local SOP.

For information on **FIRST AID**, refer to **FM 21-11/MCRP-3-02G**.

HOW TO USE THIS MANUAL

INTRODUCTION.

This manual contains operation instructions for the Surrogate Weapons System (SWS) when configured with the Multiple Integrated Laser Engagement System (MILES 2000), Tactical Engagement Simulation System (TESS).

MANUAL DESCRIPTION.

This manual is divided into three chapters. Chapters are further divided into sections. The chapter descriptions are provided in the following subparagraphs:

Chapter 1 is an introduction that provides general information, equipment description and data, and theory of operation.

Chapter 2 provides operating instructions.

Chapter 3 provides operator maintenance instructions.

CHAPTER 1
INTRODUCTION

SECTION I. GENERAL INFORMATION

1.1 SCOPE.

This manual describes how to install, operate, and maintain the Surrogate Weapons System (SWS) when configured with the Multiple Integrated Laser Engagement System (MILES 2000) Tactical Engagement Simulation System (TESS). The manual also explains all authorized operator maintenance. Refer any maintenance problems not covered to organizational maintenance personnel.

1.2 MAINTENANCE FORMS AND RECORDS.

Department of the Army forms and procedures used for equipment maintenance will be those described by DA PAM 738-750, The Army Maintenance Management System (TAMMS). Marine Corps personnel will use Technical Manual (TM) 4700-15/_ _, Equipment Record Procedures, and refer to the on-line MCPDS or U.S. Marine Corps (USMC) Stocklist SL-1-2, Index of Technical Publications.

1.3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS).

If your MILES 2000 equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a Quality Deficiency Report. Mail to us at Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. We'll send you a reply. For USMC personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report) to: Commander, Marine Corps Logistics Base (Code G316-1), 814 Radford Boulevard, Albany, GA 31704-1128.

1.4 CORROSION PREVENTION AND CONTROL.

a. Corrosion Prevention and Control (CPC) of material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using form SF-368. Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will assure that the information is identified as a CPC problem.

d. The form should be submitted to Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. U.S. Marine Corps personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report).

1.5 PREPARATION FOR STORAGE OR SHIPMENT.

When receiving equipment for storage or shipment, always inspect the returned equipment for damage, breaks, cracks, and cleanliness.

1.6 LIST OF ABBREVIATIONS AND GLOSSARY.

Refer to Table 1-1 for the list of abbreviations used with the MILES 2000 System and refer to Table 1-2 for the glossary.

Table 1-1. List of Abbreviations.

AAV	Assault Amphibious Vehicle
AC-DC	Alternating Current/Direct Current
ASAAF	Automatic Small Arms Alignment Fixture
ATWESS	Anti-Tank Weapons Effects Signature Simulator
AVCPS	Audio Visual Cue Pyrotechnic Simulator
BFA	Blank Firing Adapter
BIT	Built-In-Test
CD/TDTD (Controller Gun)	Controller Device/Training Data Transfer Device
CDA	Control Display Assembly
CPC	Corrosion Prevention and Control
CSWS	Crew Served Weapon System
CU	Control Unit
CVC	Combat Vehicle Crew
CVS	Combat Vehicle System
DC-DC	Direct Current/Direct Current
DPCU	Data Processing Control Unit
EIR	Equipment Improvement Recommendation
EOD	Explosive Ordnance Disposal
FCU	Fire Control Unit
FlashWESS	Flash Weapons Effects Signature Simulator
FU	Firing Unit
ID	Identification
I/O	Input/Output
IR	Infrared
ISU	Integrated Sight Unit
ITS	Independent Target System
IWS	Individual Weapons System

Table 1-1. List of Abbreviations - Continued.

IWS Console (DPCU)	Individual Weapons System Console (Data Processing Control Unit)
KSI	Kill Status Indicator
LAV	Light Armored Vehicle
LASER	Light Amplification by Simulated Emission of Radiation
LED	Light Emitting Diode
LTU	Laser Transmitter Unit
LU	Loader Unit
MARS	MILES After-Action Review System
MCS	Master Control Station
MG	Machine Gun
MGS	Missile Guidance System
MGSS	Main Gun Signature Simulator
MILES	Multiple Integrated Laser Engagement System
O/C	Observer/Controller
OTPD	Optical Turret Positioning Device
PID	Player Identification
Pk	Probability of Kill
PMCS	Preventive Maintenance Checks and Services
PROM	Programmable Read-Only Memory
SAT	Small Arms Transmitter
SMAW	Shoulder-Mounted Assault Weapon
SWS	Surrogate Weapons System
TAMMS	The Army Maintenance Management System
TESS	Tactical Engagement Simulation System
TM	Technical Manual
TNB	Turret Network Box
TOW	Tube-Launched Optically-Tracked Wire-Guided Weapon System
ULT	Universal Laser Transmitter
USMC	United States Marine Corps
V	Volt
Vac	Volts Alternating Current
Vdc	Volts Direct Current

Table 1-2. Glossary.

Administrative Kill	A kill initiated by the CD/TDTD (Controller Gun) for administration purposes.
Automatic Small Arms Alignment Fixture (ASAAF)	Device used to align the Small Arms Transmitter (SAT) to the sights on a weapon.
Catastrophic Kill	A kill that totally disables a vehicle or individual.
Cheat Kill	A kill is assessed to a system when a tamper attempt has been detected.
Commo Kill	A kill that disables external communications.
Controller	An umpire or referee in a MILES 2000 training exercise.
CD/TDTD (Controller Gun)	A device used by the Controller to upload, download and test the MILES 2000 system.
Fastener Tape	A hook and pile type tape used to hold vehicle detector belts and other MILES 2000 equipment in place.
Firepower Kill	A kill that disables vehicle weapons.
Helmet Harness	The part of the IWS attached to the helmet or soft cover.
Hit	Simulated contact with incoming fire that does not result in a Kill.
Individual Weapons System (IWS)	The Helmet and Torso Harness assemblies and IWS Console (DPCU), which is worn by personnel. This equipment also includes the Small Arms Transmitter (SAT).
Kill	Refer to Catastrophic Kill, Commo Kill, Firepower Kill, or Mobility Kill
Kill Status Indicator (KSI)	A device attached to a vehicle that produces an external flashing light indicating a Hit, Near Miss or Kill.
LASER	Light Amplification by Simulated Emission of Radiation. A narrow beam of light capable of transmitting information.
Laser Beam	In MILES 2000 equipment, an eye-safe, invisible beam of light that simulates weapons fire.
Laser Detector	A device that senses incoming laser beams.
Laser Transmitter	A device that transmits a laser beam.
Main Gun Signature Simulator (MGSS)	A device that produces a flash and bang to simulate main gun firing.
Mobility Kill	A kill that disables the vehicle movement. The crew has 20 seconds to bring the vehicle to a stop. If motion is sensed after the 20 seconds, a Cheat Kill will occur.
Near Miss	Laser fire close enough to be sensed by a laser detector, but not close enough to cause a Hit or Kill.

Table 1-2. Glossary - Continued.

Optical Turret Positioning Device (OTPD)	A device that provides an optical reference signal to the turret detector belts (on applicable vehicles) to determine the turret position with reference to the hull.
Reset	Brings the system to the ready (alive) condition. In a Combat Vehicle System (CVS), the reset brings the system to a ready condition and returns ammunition to the default levels.
Resurrect	When a CVS is resurrected, the system is brought to a ready condition, but the ammunition levels remain as they were when the system was killed.
Small Arms Transmitter (SAT)	A laser transmitter used on various individual and vehicle-mounted rifles and machine guns.
Torso Harness	The part of the IWS that is worn on the upper body.
Universal Laser Transmitter (ULT)	A laser transmitter used on various combat vehicle systems mounted on the main gun and the coax machine gun.
Weapon Token	Is embedded in software and allows the IWS Console (DPCU) to enable a SAT. The Weapon Token is transmitted to the IWS when the system is reset/resurrected by the CD/TDTD (Controller Gun). The SAT cannot be enabled without a Weapon Token and will not have one in the following conditions: system is killed or another SAT is enabled with the same Torso Harness.

NOTE

Vehicle kits contain the SATs for the vehicle mounted weapons, but do not include IWS SATs. IWS equipment is issued separately.

1.7 SAFETY, CARE, AND HANDLING.

Before, during and after operation of equipment, read and adhere to all applicable WARNINGS and CAUTIONS. Perform all preventive maintenance checks and services as scheduled, and report any discrepancies as soon as possible. Use the proper tools and procedures for installation, troubleshooting, removal and replacement of components, and notify higher echelon maintenance personnel when warranted.

Although MILES 2000 consists of ruggedized equipment designed to withstand extreme vibration, shock, and environmental stresses. Treat the equipment with reasonable care. Do not use excessive force when handling, packing, or stowing equipment. Responsible handling and use will help prolong the life cycle and appearance of the equipment.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1.8 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

The MILES 2000 Surrogate Weapons System (SWS) consists of the AT4 kit and Shoulder-Mounted Assault Weapon (SMAW) kit. The AT4 kit consists of the AT4 Simulator with the Laser Transmitter Unit (LTU) preinstalled and the Anti-Tank Weapons Effects Signature Simulator (ATWESS). The SMAW kit consists of the SMAW Rocket Casing, the ATWESS and the SMAW Launch Tube with the LTU preinstalled.

Laser detectors, mounted on vehicles and worn by crew members and individual soldiers/marines, sense incoming fire. The MILES 2000 system electronics determines the accuracy and simulated damage of incoming fire. The system also detects the type of weapon directing fire.

1.8.1 Capabilities and Features.

a. Realistic simulation of flash, bang and smoke by pyrotechnic means.

b. Uses blank fire and ATWESS to add realism.

c. Percussion initiated pyrotechnics.

d. Normal firing procedures used for all weapons.

e. Uses eye-safe laser transmitters.

f. Compatible with all other MILES devices.

1.9 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

a. AT4. The AT4 Simulator consists of the LTU (preinstalled) and the ATWESS.

b. SMAW. The SMAW consists of the SMAW Launch Tube with the LTU installed, and the Rocket Casing which contains ATWESS.

1.10 EQUIPMENT DATA.

Table 1-3 defines the equipment data.

Table 1-3. Equipment Data.

EQUIPMENT	WEIGHT (POUNDS)	DIMENSIONS L x W x D (INCHES)
SMAW Rocket Casing	17.9	28.7 X 3.4
SMAW Launch Tube	18.0	29.72 x 3.85
AT4 Simulator Tube	14.8	40 X 3.4

SECTION III. THEORY OF OPERATION

1.11 BASIC PRINCIPLES OF OPERATION.

1.11.1 Basic Principles of Operation (MILES 2000). The MILES 2000 system uses laser beams to simulate actual weapons fire. An eye-safe invisible laser beam is sent out by each weapon's transmitter when it is fired. The laser beam is coded, and simulates all of the weapon's capabilities including range, accuracy, and destructive capability.

Laser detector systems are used to sense incoming fire. The detector systems register incoming laser beams and determine whether they have scored a Near Miss, Hit, or Kill. Incoming fire can result in more than one type of a Hit or Kill. Types of Hits or Kills include Mobility, Communications, Firepower, or a Catastrophic Kill of the entire vehicle.

Table 1-4 defines the Kill Indication Chart.

1.11.2 Principles of Operation Surrogate Weapons System (SWS). The SWS uses an encoded laser beam transmitted to other MILES 2000 units to simulate the SMAW and AT4 rockets. The LTU of the SWS is designed to fit inside the SWS rocket tubes, and interfaces with the SWS triggers, inductive loops, and the ATWESS.

When the SMAW or AT4 is fired, the LTU sends an encoded laser beam to communicate rocket engagement data to a target. This data includes MILES weapons codes, Man Kill code words, Near Miss code words, ammunition type and PID. Simultaneously, the ATWESS of the SMAW or AT4 provides a flash and bang for realism. The SWS will also communicate SMAW spotting rifle engagement data to a target. The spotting rifle will have its own MILES code and PID.

1.11.3 SWS Configuration. The AT4 configuration of the SWS consists of the AT4 Simulator which contains the LTU assembly, and the ATWESS. The SMAW configuration of the SWS consists of the SMAW Rocket Casing, which contains the ATWESS, and the SMAW Launch Tube, which contains the LTU assembly. The LTU fits inside the surrogate weapon rocket tubes and interfaces with the surrogate weapon triggers, inductive loops, and ATWESS.

Table 1-5 defines the Kit/Equipment List, with supporting Figures 1-1 and 1-2.

Table 1-4. Kill Indication Chart.

TYPE OF HIT/KILL	NUMBER OF KSI FLASHES	AUDIBLE INDICATION
Vehicle		
SMAW Spotting Rifle	1 Flash	None
Near Miss	2 Flashes	Near Miss.
Hit	4 Flashes	Hit.
Mobility Kill	4 Flashes	Hit, Mobility. Stop Vehicle. (The crew has 20 secs to bring the vehicle to a stop.)
Fire Power Kill	4 Flashes	Hit, Fire Power.
Communications Kill	4 Flashes	Hit, Commo Kill. (disables external communications only)
Catastrophic Kill	Flashes Continuously	Vehicle Kill
Administrative Kill	Flashes Continuously	Vehicle Kill
Cheat Kill	Flashes Continuously	Cheat Kill
Reset/Resurrect	1 Flash	Reset/Resurrect
IWS		
Near Miss	N/A	2 Beeps
Kill	N/A	Continuous
Administrative Kill	N/A	Continuous
Cheat Kill	N/A	Continuous
Reset/Resurrect	N/A	4 Beeps

Notes: Cheat Kill will occur during a Mobility Kill if the vehicle does not stop within the allotted 20 seconds or moves after it has stopped. A Cheat Kill will occur when disconnecting any of the following pieces of vehicle equipment: Kill Status Indicator (KSI), any Detector Belt/Array, or Power Controller (must be reconnected for cheat to be indicated), or removing the battery on Individual Weapons System (IWS) Console Data Processing Control Unit (DPCU).

The KSI is issued as part of a separate equipment kit.

In the event of a Catastrophic or Communications Kill, external communications can be over-ridden for **EMERGENCIES ONLY** by pressing the USER INFO push button on the Control Unit, selecting communication override and pressing the ENTER push button.

Table 1-5. Kit/Equipment List.

PACKAGE NOMENCLATURE: AT4 SIMULATOR, MILES 2000				
PACKAGE PERTAINS TO: 147750-2				
PACKAGE CONTENTS				
QUANTITY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
1	AT4 SIMULATOR SYSTEM ASSY	147751	147751-2	
AR	TRANSIT CASE, AT4	147766	147766-1	1, 2
AR	OPERATOR'S MANUAL		TD 23-6920-704-10	

NOTES:

1. MAX. QTY. OF 4 AT4 ASSEMBLIES MAY BE PACKED IN ONE TRANSIT CASE.
2. MARK THE TRANSIT CASE (2 PLACES) WITH THE APPLICABLE DASH NUMBER AFTER THE BASIC PART NUMBER. THE MARKING SHALL BE 6.35 mm HIGH CHARACTERS MINIMUM, COLOR WHITE NO. 27925 IN ACCORDANCE WITH FED-STD-595 LOCATED AS SHOWN ON TRANSIT CASE DRAWING.

See Figure 1-1 located at the end of this table.

PACKAGE NOMENCLATURE: SMAW SIMULATOR SYSTEM, MILES 2000				
PACKAGE PERTAINS TO: 147800-2				
PACKAGE CONTENTS				
QUANTITY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
1	LAUNCH TUBE ASSY-SMAW	147841	147841-2	
1	ROCKET CASING ASSY-SMAW	147804	147804-2	
AR	TRANSIT CASE, SMAW	147845	147845-1	1, 2
AR	OPERATOR'S MANUAL		TD 23-6920-704-10	

NOTES:

1. MAX. QTY. OF 4 SMAW ASSEMBLIES MAY BE PACKED IN ONE TRANSIT CASE.
2. MARK THE TRANSIT CASE (2 PLACES) WITH THE APPLICABLE DASH NUMBER AFTER THE BASIC PART NUMBER. THE MARKING SHALL BE 6.35 mm HIGH CHARACTERS MINIMUM, COLOR WHITE NO. 27925 IN ACCORDANCE WITH FED-STD-595 LOCATED AS SHOWN ON TRANSIT CASE DRAWING.

See Figure 1-2 located at the end of this table.

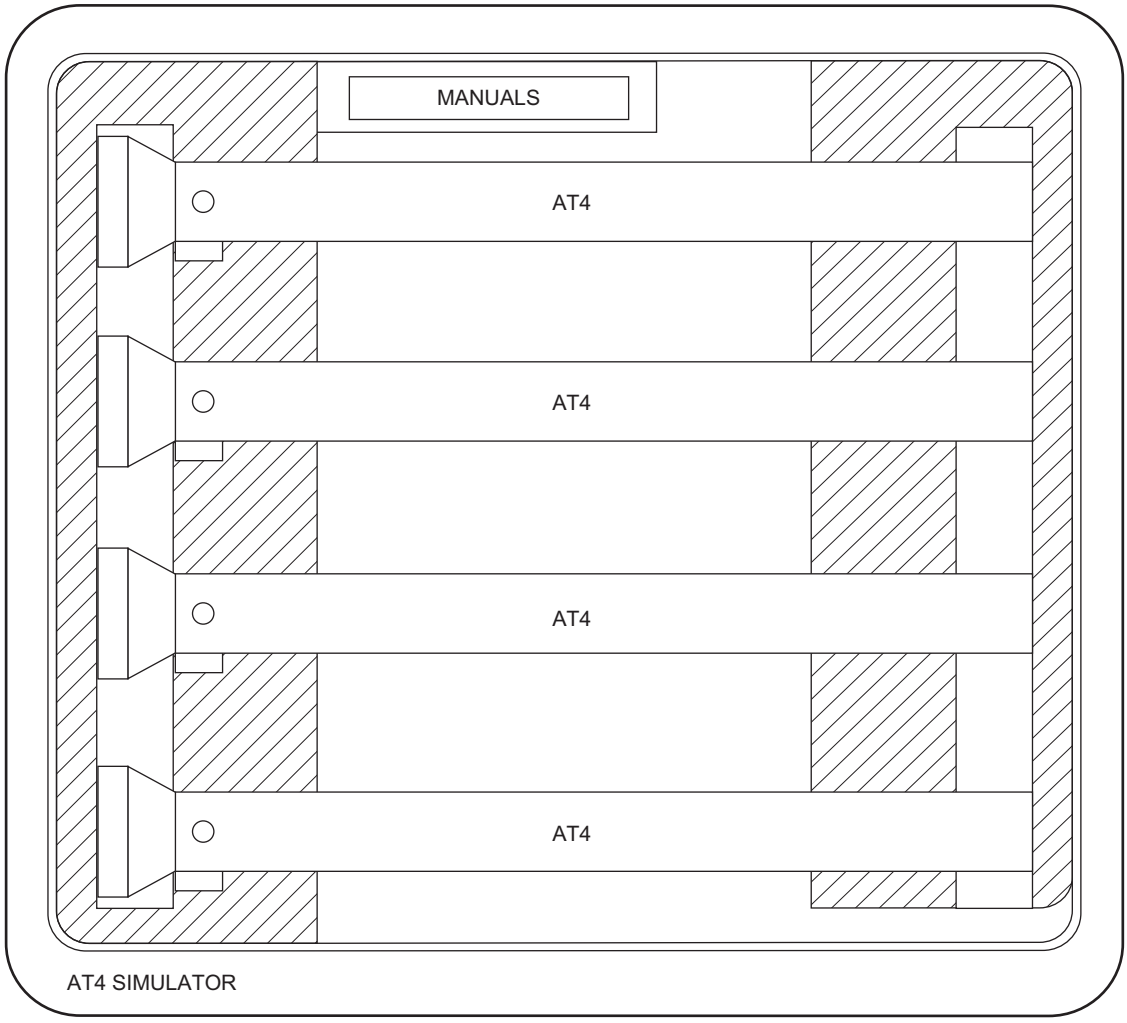


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Figure 1-1. AT4 Simulator Transit Case.

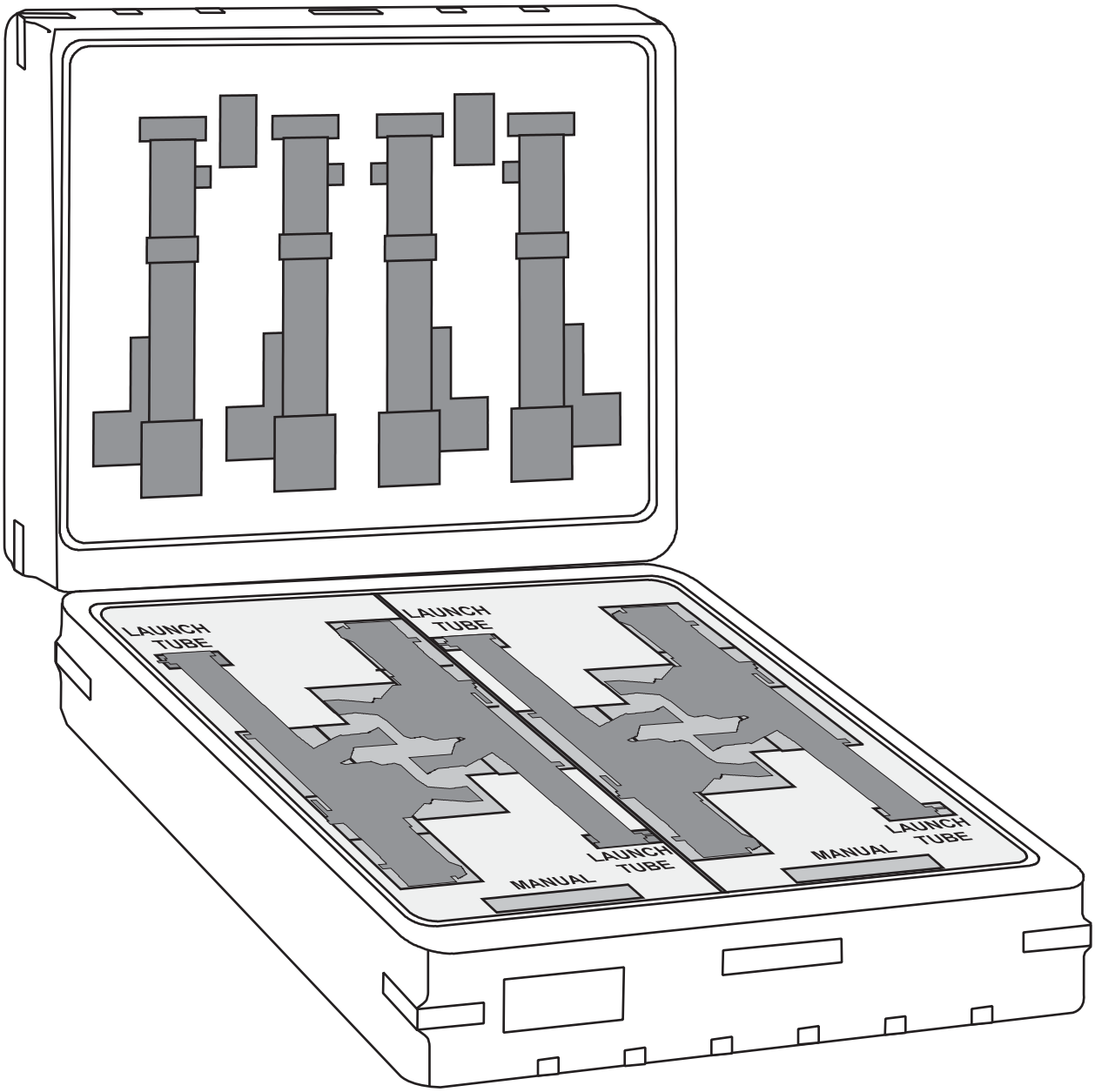

Figure 1-2. SMAW Transit Case.

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CHAPTER 2
OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2.1 EQUIPMENT CONTROLS AND INDICATORS.

The following figures, as listed in Table 2-1, illustrate and describe the MILES 2000 Surrogate Weapons operating controls and indicators.

Table 2-1. Controls and Indicators Reference.

ITEM	FIGURE NO.
AT4	2-1
SMAW	2-2

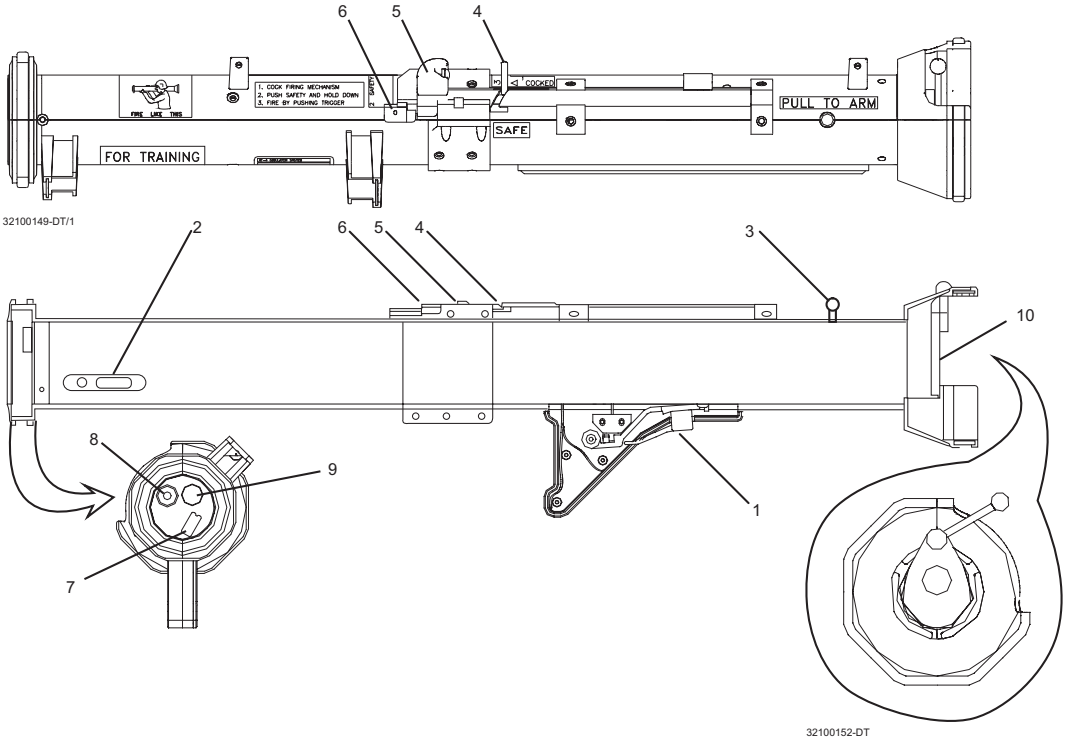

Figure 2-1. AT4 Simulator.

1. INDUCTIVE LOOP INTERFACE BUTTON. Contacts inductive loop in the Torso Harness and interfaces the weapon with the Individual Weapons System (IWS).

2. AT4 DISPLAY AND PUSH BUTTON. The display enables the user to view the Built-In-Test (BIT) in progress, and the number of rocket rounds loaded. The push button allows the user to step through the BIT.

3. ARM/SAFE PLUNGER. Pushed into the SAFE position prior to removing a discharged ATWESS or installing a new ATWESS cartridge. Pulled to the ARM position after the ATWESS cartridge has been installed, the breech door is locked, and the AT4 display shows the number of rocket rounds loaded.

4. COCKING LEVER (not shown). Loads and cocks the AT4 when the lever is pulled back and released.

5. TRIGGER PUSH BUTTON (not shown). Pressed in conjunction with the Safety button in order to fire the AT4.

6. SAFETY BUTTON. Enables the AT4 when pressed.

7. OPTICAL PORT. Bidirectional IR communication link used by Controller Device/Training Data Transfer Device (CD/TDTD) (Controller Gun) to upload data for AT4 setup.

8. BATTERY COMPARTMENT. Houses two AA (1.5 Vdc) batteries.

9. LASER TRANSMITTER UNIT (LTU) WINDOW. Window through which the AT4 laser beam is transmitted.

10. ATWESS. Anti-Tank Weapons Effects Signature Simulator. Provides an audio (bang) and visual (smoke) indication to simulate weapons fire.

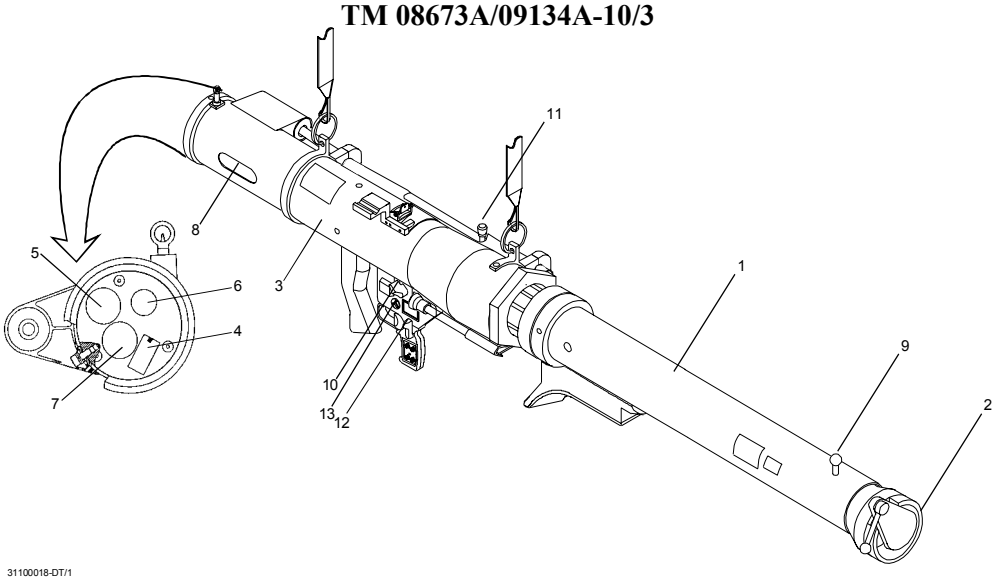

Figure 2-2. SMAW (SWS).

1. ROCKET CASING. Contains the ATWESS.

2. ATWESS. Anti-Tank Weapons Effects Signature Simulator. Provides an audio (bang) and visual (smoke) indication to simulate weapons fire.

3. LAUNCH TUBE. Contains the Laser Transmitter Unit (LTU).

4. OPTICAL PORT. Bidirectional IR communication link used by the CD/TDTD (Controller Gun) to upload data for SMAW setup.

5. BATTERY COMPARTMENT. Houses two AA (1.5 Vdc) batteries.

6. LASER TRANSMITTER UNIT WINDOW. Window through which the SMAW laser beam is transmitted.

7. FlashWESS WINDOW. Indicates (flashes) when the SMAW has been fired.

8. SMAW DISPLAY AND PUSH BUTTON. The display enables the user to view the BIT in progress, the selection of a missile type or spotting rifle round and error message. The push button allows the user to step through the BIT and select missile type or spotting rifle round.

9. ARM/SAFE PLUNGER. Pushed into the SAFE position prior to removing a discharged ATWESS or installing a new ATWESS cartridge. Pulled to the ARM position after the ATWESS cartridge has been installed, the breech door is locked, and the SMAW display shows one of three firing modes.

10. CHARGE LEVER. In the "CHARGE" position, charges the weapon, which enables it to fire.

11. SPOTTING RIFLE COCKING LEVER. Loads and cocks the spotting rifle when the lever is pulled back and released.

12. LAUNCH LEVER. In the "LAUNCH" position (pressed forward), disables the spotting rifle and enables the launch mode.

13. FIRE/SAFE LEVER. In the FIRE position, the lever enables the SMAW trigger for spotting rifle and launch mode. In the SAFE position, the lever disables the SMAW trigger.

SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Preventive Maintenance Checks and Services (PMCS) will ensure that the MILES 2000 equipment will be ready for operation and perform satisfactorily throughout its mission. Preventive maintenance checks consist of performing a systematic inspection to discover defects before they result in operational failure of the equipment. Defects or malfunctions discovered by the crew during use of the MILES 2000 equipment, or as a result of performing maintenance checks and services, will be reported using the proper forms. (Refer to DA PAM 738-750.)

2.2 INTRODUCTION TO PMCS TABLE.

Operator Preventive Maintenance Checks and Services are shown in Table 2-2. Tasks to be performed before operation appear in the "B" column under the heading "Interval." Tasks to be performed during operation are checked in the "D" column. Tasks to be performed after operation are checked in the "A" column. Tasks to be performed weekly are checked in the "W" column, with tasks to be performed monthly checked in the "M" column.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1) wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth. **The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.**

NOTE

Within designated interval, these checks are to be performed in the order listed.

B - Before Operation
D - During Operation
A - After Operation
W - Weekly
M - Monthly

Table 2-2. Operator Preventive Maintenance Checks and Services.

ITEM NO.	ITEM TO BE INSPECTED	INTERVAL B	D	A	W	M	PROCEDURES CHECK FOR AND HAVE REPAIRED	EQUIPMENT IS NOT READY/AVAILABLE IF:
1.	Display	✓		✓			Cracks in display window.	Display window broken or cracked.
		✓					Check for batteries in unit.	No batteries in unit.
		✓					Upon power-on, check for display in display window.	No display in display window.

SECTION III. OPERATION UNDER USUAL CONDITIONS

2.3 SWS OPERATIONS.

SWS equipment must be inspected and prepared as described in the following paragraphs prior to use.

NOTE

To operate the MILES 2000 SWS, you must have an IWS Torso Harness on and in a "Ready" status. Refer to IWS Operator's Manual, TD 23-6920-702-10/TM 6920-10/7.

2.3.1 AT4.

2.3.1.1 AT4 Assembly Procedures. The MILES 2000 AT4 requires no assembly. Ensure the weapon is on "SAFE" at all times during preoperational procedures.

a. Install batteries.

(1) Locate the cap with the retainer wire attached to the front of the Launch Tube.

NOTE

Upon inserting the batteries, BIT will automatically begin. BIT lasts for approximately one minute.

(2) Remove the cap and insert two AA (1.5 Vdc) batteries positive (+) end down. Install the cap securely.

(3) The AT4 will initiate the Power-On Built-In-Test (BIT). This will require approximately one minute to complete.

b. Power-On BIT procedures.

(1) When the AT4 displays ".8.8.8.8.8" (.8 running across the window), press the button next to the window and release.

(2) The AT4 will display "PUSH." Press the display button and release.

(3) The AT4 will then complete the BIT. If there are no problems, the AT4 will display "PASS." Insufficient power will be indicated with a window display of "Lo b (low battery)." A BIT error will be indicated with a window display of "fnXX," where "XX" is the code number for the area that is malfunctioning.

2.3.1.2 Initial Adjustments, Before Use, Daily Checks, and Self-Test Requirements. Perform the following procedures before operating MILES 2000 AT4:

a. Ensure PMCS described in Section II have been performed.

b. Perform the Functional Checks described in Section V.

2.3.1.3 AT4 Operating Procedures.

NOTE

To operate the MILES 2000 SWS, you must have an IWS Torso Harness on and in a "Ready" status. Refer to IWS Operator's Manual, TD 23-6920-702-10/TM 6920-10/7.

a. Controller Initialization. Ask the Controller to initialize the AT4, thereby loading the number of rockets and reload time.

b. Enable the AT4 display by pressing the AT4 display button and releasing it after the first period comes on. The AT4 should display: "A.4.X.X." A4 is the weapon identification and XX is the number of rocket rounds loaded (04 at start).

c. At the rear of the AT4, move the ATWESS breech lock lever to the open position.

d. Open the breech door as far as it will open. (This cocks the ATWESS.)

WARNING

Visually check the SMAW or AT-4 to see if the firing pin is protruding. If it is, **DO NOT** install the ATWESS cartridge as serious personal injury may occur. Return the weapon to the issue facility/authority. Sign out another weapon.

e. Insert an ATWESS cartridge.

f. Close the breech door and move the breech lock lever to the closed position. Steps c. thru f. simulate loading a rocket.

g. Pull the SAFE/ARM plunger up to the "ARM" position.

h. Place the AT4 on your right shoulder harness. Situate the weapon so that the button on the underside of the shoulder rest makes contact with the right shoulder strap of the IWS Torso Harness. Verify that the IWS Console (DPCU) display indicates "Ready."

NOTE

IWS to AT4 communication may be verified by pressing the AT4 display button ensuring that the AT4 display flashes briefly. This indicates that the AT4 is ready. The display will not flash until the reload time set by the controller in 2.3.1.3a. has passed.

i. Cock the firing mechanism by pushing the cocking lever and releasing it.

j. Press and hold the weapon safety switch.

WARNING

ATWESS cartridges may expel fragments/ debris. Maintain prescribed actual weapon back blast danger/caution zones when using the ATWESS, or personal injury could occur.

k. Fire the AT4 in accordance with standard operating procedures.

WARNING

Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local SOP.**NOTE**

Before a Commanded BIT can be run, the window display must be blank.

l. Perform Commanded BIT by pressing button next to display window and hold it until the second decimal appears; then follow procedures in steps 2.3.1.1b.(1)-(3).

2.3.2 SMAW.

2.3.2.1 SMAW Assembly Procedures.

WARNING

To avoid personal injury when handling the SMAW, ensure the FIRE/SAFE lever is in the "SAFE" position, and the CHARGE lever is NOT in the "CHARGE" position before inserting or removing the "Rocket Casing." If the charge lever is in the "CHARGE" position, follow these procedures: 1) Place the FIRE/SAFE lever in the "FIRE" position. 2) Flip the launch lever while pulling the trigger. This will trip the charge lever. 3) Place the FIRE/SAFE lever in the "SAFE" position.

WARNING

DO NOT let the muzzle of the SMAW Launch Tube touch the ground. If the muzzle should touch the ground, check the Launch Tube and bore of the spotting rifle for dirt, rocks or other foreign material, and remove and clean. Keep the muzzle pointed down range at all times, or personal injury could occur.

a. Assume a comfortable kneeling position with the SMAW across your leg, and the firing mechanism pointing upward and outward. Remove Rocket Casing end cap. Insert the Rocket Casing into the Launch Tube, aligning arrows, and rotate the Rocket Casing approximately 1/4 turn until it locks in place.

b. If the muzzle of the Launch Tube touches the ground, perform the following steps:

   (1) Check inside the Launch Tube for dirt, rocks, or other foreign material. Remove any foreign material and wipe inside with a soft, dry cloth. Ensure the SMAW optic port, spotting rifle firing display and laser window are not obstructed.

   (2) Check the bore of the spotting rifle for dirt; remove if necessary.

c. Install batteries.

   (1) Locate the cap with the retainer wire attached on the front of the Launch Tube.

   (2) Remove the cap and insert two AA (1.5 Vdc) batteries positive (+) end down. Install the cap securely.

   (3) The SMAW will initiate the Power-On BIT. This will require approximately one minute to complete.

NOTE

The SMAW must be assembled in order for the BIT test to pass.

d. Power-On BIT procedures.

   (1) When the SMAW displays ".8.8.8.8.8" (.8 running across the window), press the button next to the window and release.

(2) The SMAW will display "PUSH." Press the button and release.

(3) The SMAW Flash Weapons Effects Signature Simulator "FlashWESS" on the front of the Launch Tube will begin flashing. Press the button after it flashes.

(4) The SMAW will then complete the BIT. If there are no problems, the SMAW will display "PASS." Insufficient power will be indicated with a window display of "Lo b (low battery)." A BIT error will be indicated with a window display of "fnXX," where "XX" is the code number for the area that is malfunctioning.

2.3.2.2 Initial Adjustments, Before Use, Daily Checks, and Self-Test Requirements. Perform the following procedures before operating MILES 2000 SMAW:

a. Ensure PMCS described in Section II have been performed.

b. Perform the Functional Checks described in Section V.

2.3.2.3 SMAW Operating Procedures.

NOTE

To operate the MILES 2000 SWS, you must have an IWS Torso Harness on and in a "Ready" status. Refer to IWS Operator's Manual, TD 23-6920-702-10/TM 6920-10/7.

a. Controller Initialization. Ask the Controller to initialize the SMAW, thereby loading the type and number of rockets, number of spotting rifle rounds and reload time.

NOTE

During operation of the SMAW, if a hang fire occurs, follow standard operating procedures used with the actual weapon.

b. When the SMAW displays ".8.8.8.8.8" (.8 running across the window), press the button next to the window and release. Press and release the display button until the desired rocket type appears: AA for Anti-Armor and bb for Bunker Buster. To select a rocket, press the button until the display brightens and the decimal points are also displayed (example: A.A.0.5. or b.b.0.5.). Verify that the SMAW display indicates that at least one rocket of the type selected is available.

c. Remove the Rocket Casing from the Launch Tube (if installed). Install the Rocket Casing on the Launch Tube. This simulates loading a rocket.

d. Insert (remove and replace if already inserted) the spotting rifle magazine into the magazine well, ensuring it is locked in place. This simulates loading the spotting rifle.

e. Place the charge lever in the CHARGE position. (This must be performed prior to cocking the spotting rifle.)

f. Pull the spotting rifle cocking lever back and release.

g. At the rear of the Rocket Casing, move the ATWESS breech lock lever to the open position.

g. Open the breech door as far as it will open. (This cocks the ATWESS.)

WARNING

Visually check the SMAW to see if the firing pin is protruding. If it is, **DO NOT** install the ATWESS cartridge as serious personal injury may occur. Return the weapon to the issue facility/authority. Sign out another weapon.

i. Insert an ATWESS cartridge.

j. Close the breech door and move the breech lock lever to the closed position.

k. Pull the SAFE/ARM plunger up to the "ARM" position.

l. Place the SMAW on your right shoulder. Situate the weapon so that the button on the underside of the shoulder rest makes contact with the right shoulder strap of the IWS Torso Harness. Verify that the IWS Console (DPCU) display indicates "Ready" by pressing the "i" button.

NOTE

IWS to SMAW communication may be verified by pressing the SMAW display button ensuring that the SMAW display flashes briefly. This indicates that the SMAW is ready. The display will not flash until the reload time set by the controller in Step 2.3.2.3a. has passed.

m. Place the FIRE/SAFE lever in the "FIRE" position.

WARNING

ATWESS cartridges may expel fragments/debris. Maintain prescribed actual weapon back blast danger/caution zones when using the ATWESS, or personal injury could occur.

n. Fire the SMAW in accordance with standard operating procedures.

WARNING

Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local SOP.

NOTE

Before Command BIT can be run, the window display must be blank.

o. Perform Commanded BIT by pressing the button next to the display window and hold it until the second decimal appears; then follow procedures in steps 2.3.2.1d.(1)-(4).

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

2.4 ASSEMBLY AND PREPARATION FOR USE UNDER UNUSUAL CONDITIONS.

2.4.1 Unusual Environment/Weather. MILES 2000 equipment is ruggedized to withstand extreme changes in temperature, terrain, and environment. Therefore, assembly and preparation in unusual environment/weather should only require the caution necessary to ensure the safety of the operators and other participants.

2.4.2 Fording and Swimming. MILES 2000 equipment is waterproof and ruggedized. Therefore, equipment transport which requires fording and/or swimming should only require caution necessary to safeguard operators and participants, and to maintain control and accountability of the equipment.

2.4.3 Emergency Procedures. Immediate action is required for the following:

a. ATWESS cartridge malfunction.

b. Malfunctions associated with MILES 2000 gear/weapon system.

MILES 2000 equipment requires no other additional procedures for emergency situations, as the equipment has been developed to be used for training simulations encompassing a great variety of conditions and levels of threat.

SECTION V. FUNCTIONAL CHECKS

2.5 FUNCTIONAL TEST PROCEDURES.

The functional check for MILES 2000 SWS equipment is accomplished by the BIT performed by the LTU within the SWS. It will run the BIT, and the display screen will stay lighted during the test. Once the test has been run, the SWS will display the results on the screen. Table 3-1 in Chapter 3, Section I, Troubleshooting, contains the list of possible error messages the SWS may display with MILES 2000 equipment.

2.5.1 Built-In-Test (BIT). Perform the following actions to run the Commanded BIT for the AT4 and SMAW Surrogate Weapons.

NOTE

Before a Commanded BIT can be run, the window display must be blank**.**

2.5.1.1 BIT Procedures for the AT4.

a. Perform Commanded BIT by pressing the button next to display window and hold it until the second decimal appears.

b. When the AT4 displays ".8.8.8.8.8" (.8 running across the window), press the button next to the window and release.

c. The AT4 will display "PUSH." Press the button and release.

d. The AT4 will then complete the BIT. If there are no problems, the AT4 will display "PASS." Insufficient power will be indicated with a window display of "Lo b." A BIT error will be indicated with a window display of "fnXX," where "XX" is the code number for the area that is malfunctioning.

2.5.1.2 Commanded BIT Procedures for the SMAW.

a. Perform Commanded BIT by pressing the display button and holding it until the second decimal appears.

b. When the SMAW displays ".8.8.8.8.8" (.8 running across the window), press the button next to the window and release.

c. The SMAW window will display "PUSH." Press the button and release.

d. The SMAW "FlashWESS" on the front of the Launch Tube will begin flashing. Press the button after it flashes.

e. The SMAW will then complete the BIT. If there are no problems, the SMAW will display "PASS." Insufficient power will be indicated with a window display of "Lo b." A BIT error will be indicated with a window display of "fnXX," where "XX" is the code number for the area that is malfunctioning.

CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS

SECTION I. TROUBLESHOOTING

3.1 TROUBLESHOOTING PROCEDURES.

a. Following are troubleshooting procedures for problems which may be encountered with Surrogate Weapons System (SWS) operation. Operator troubleshooting procedures involve identifying a problem and isolating the problem to the most likely part of the equipment. Generally the BIT run by the SWS identifies most problems within the specific SWS (AT4 or SMAW), and produces an error message to let the user know that there is a problem. Operator troubleshooting is neither extensive nor difficult. In most cases, the recommended action will be to turn in the defective SWS for repair and replace it with a working unit. Table 3-l lists problems that may be encountered, as well as possible solutions.

b. You may encounter equipment problems not addressed in this section. If this is the case, notify the appropriate personnel (a supervisor and/or higher echelon maintenance personnel) as soon as possible.

Table 3-1. MILES 2000 Troubleshooting Chart for SWS Configuration.

PROBLEM	PROBABLE CAUSE(S)	ACTION
"Lo b" (FN10) on display after BIT.	Batteries low.	Replace batteries; retest.
"Lo b" displayed after retest.	Unit malfunction.	Replace unit.
Weapon does not fire.	Dirt/Foreign material in weapon.	Place weapon on SAFE and clear. Inspect for obstructions, dirt, etc., and clean if necessary.
Weapon does not fire after cleaning (SMAW).	Faulty ATWESS.	Discard firing tube. Attach new firing tube and test.
Weapon still does not fire (SMAW).	Unit malfunction.	Replace unit.
Weapon does not fire after cleaning (AT4).	Unit malfunction.	Replace unit.
Spotting Rifle does not fire (SMAW).	Magazine not locked in place.	Reseat magazine, test.
Spotting Rifle still does not fire.	Various.	Replace unit.

SECTION II. OPERATOR MAINTENANCE

3.2 OPERATOR MAINTENANCE PROCEDURES.

Much of the operator maintenance for the MILES 2000 equipment consists of removing the defective item and replacing it with functioning equipment. Remove/Replace procedures for both the AT4 and SMAW are included below.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures. It consists of normal cleaning procedures. Clean all areas using a soft rag dampened with water.

3.2.1 AT4 Removal.

a. Remove the battery cap with the retainer wire attached to the front of the Launch Tube.

b. Remove the batteries and replace battery cap.

c. Clean equipment and prepare for turn-in.

3.2.2 AT4 Replacement.

a. Remove the battery cap with the retainer wire attached to the front of the Launch Tube.

b. Install two AA (1.5 volt) batteries positive end down. Secure the battery cap.

c. Upon completion of BIT, insert ATWESS cartridge and fire weapon normally.

3.2.3 SMAW Removal.

a. Remove the battery cap with the retainer wire attached to the front of the Launch Tube.

b. Remove the batteries and replace battery cap.

c. Disconnect the Rocket Casing from the Launch Tube by rotating the Rocket Casing counterclockwise approximately 1/4 turn until it unlocks.

d. Insert spotting rifle magazine into the Rocket Casing End Cap. Replace End Cap on the Rocket casing.

e. Clean equipment and prepare for turn-in.

3.2.4 SMAW Replacement.

a. Connect the Rocket Casing to the Launch Tube by rotating the firing tube clockwise approximately 1/4 turn until it locks in place.

b. Remove the battery cap with the retainer wire attached to the front of the Launch Tube.

c. Install two AA (1.5V) batteries positive end down. Secure the battery cap.

d. Upon completion of BIT, insert ATWESS cartridge and fire weapon normally.

3.3 SWS DISASSEMBLY PROCEDURES.

WARNING

Use safe/proper handling procedures when removing undetonated ATWESS cartridges or personal injury could occur. Dispose of undetonated cartridges in accordance with local SOP.

Ensure that the ATWESS cartridge has been removed and the safeties are on prior to disassembling the AT4 or SMAW.

3.3.1 Disassembly Procedures for AT4.

a. Remove the two AA (1.5 Vdc) batteries from the Launch Tube.

b. Clean and inspect equipment. If there is any damage to the AT4, report damage on the appropriate form and turn in with damaged equipment.

c. Place equipment in transit case.

3.3.2 Disassembly Procedures for SMAW.

a. Remove the two AA (1.5 Vdc) batteries from the Launch Tube.

WARNING

To avoid personal injury when handling the SMAW, ensure the FIRE/SAFE lever is in the "SAFE" position, and the CHARGE lever is NOT in the "CHARGE" position before inserting or removing the "Rocket Casing." If the charge lever is in the "CHARGE" position, follow these procedures: 1) Place the FIRE/SAFE lever in the "FIRE" position; 2) Flip the launch lever while pulling the trigger. This will trip the charge lever; 3) Place the FIRE/SAFE lever in the "SAFE" position.

b. Assume a comfortable sitting position with the SMAW across your lap, and the Rocket Casing pointing upward and outward. Disconnect the Rocket Casing from the Launch Tube, and rotate the Rocket Casing counterclockwise approximately 1/4 turn until it unlocks.

c. Clean and inspect equipment. If there is any damage to the SMAW, report damage on the appropriate form and turn in with damaged equipment.

d. Place equipment in transit case.

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